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U.S. Department
of Transportation
**Federal Highway
Administration**

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Memorandum

SP-96-005-CE

Subject: INFORMATION: OMC Guidelines for Performance-based
Brake Testing Technologies

Date: APR 1 1996

From: Director, Office of Motor Carrier
Safety and Technology

Reply to
Attn. of: HSA-20

FMCSA-99-6266-1

To: Regional Directors, Office of Motor Carriers
THRU: Mr. Clinton O. Magby, II
Director, Office of Motor Carrier
Field Operations, HFO-1

The Office of Motor Carriers Office of Safety and Technology has recently determined that certain performance-based brake testing technologies are eligible for funding under MCSAP. These devices are prototype in nature, and are approved for screening and sorting purposes only at this time.

The devices mentioned in this memorandum are the sole technologies that are eligible for MCSAP funds at this time. Additional machines and technologies may become eligible in the future.

Please distribute the attachment to your State MCSAP agency. Should you have questions regarding the guidelines or report, please contact Bill Mahorney (202) 366-6515 or Paul Alexander (202) 366-5881.


James E. Scapellato

Attachment

OMC GUIDELINES FOR PERFORMANCE-BASED BRAKE TESTING DEVICES

Synopsis: This document provides guidelines for purchase and use of certain performance-based brake testing devices under the MCSAP. These brake testing devices are approved for **screening and sorting purposes** only at this time. An Interim Report will be available in early April that will describe each machine in detail. It is suggested that each interested State read the Interim Report to determine which, if any machine is most suitable for their individual needs. A final report will be published during FY 1996 that will describe additional technologies and results of further testing. The Office of Motor Carriers Safety and Technology envisions the development of performance specifications and test procedures to include other types of performance-based brake testing devices in the future.

It is important to note that these machines are prototypes, and may be modified based on the manufacturers response to our findings. As a result, we recognize that changes in design will occur. To be eligible for funding, any new or redesigned version of these two machines must be cleared through NHTSA's Vehicle Research and Test Center to ensure that the machines do not materially differ from those approved. Additionally, upgrades or enhancements to existing machines must also be cleared in the same manner.

Product Availability: Hunter B400T Flat-Plate Tester (in-ground), Nepean Mark III Roller Dynamometer (portable).

Funding Options: MCSAP Basic, supplemental, roll-over, or special (w/20% match) Grants.

Associated Costs: Costs of machine usage, including, but not limited to: maintenance agreements, future hardware and software upgrades, replacement/repair/maintenance of non-warrantied items, towing vehicle (must be justified, location and use factors, etc.), training (initial and ongoing), etc.

State Enforcement Plans/Grant Requests:

1. Each State must submit an enforcement plan/grant request that describes how, where and when each machine will be utilized. A State must establish and commit to specific procedures in order to effectively utilize these performance-based brake testing devices and to assist with the acquisition of data and statistics that will enable the future development of enforceable, performance-based criteria. The procedures include:
2. Monthly Reporting

Monthly reports should include a tabular summary of usage and maintenance logs, including:

The number of days used, number of days not used due to a) machine problems, b) manpower (including weekends, holidays, or other days not scheduled for use), or c) weather.

The number of trucks tested, and the number put out of service as a result of CVSA inspection to confirm machine indicated problem, and the number of vehicles for which a machine-identified problem could not be confirmed on vehicle.

Any vehicles that you are unable to inspect and the reason.

Any sites (for portable units only) at which you are unable to deploy or use the machine properly, and a description.

Any weather conditions that make operation difficult or impossible.

A State must collect and forward to Battelle on floppy disk the results of all tests performed. If a defective brake was indicated, and the machine appeared to properly test the brake, then a full Level I or Level IV CVSA brake inspection must be performed to verify defects, and take appropriate action. Test results of such "defective" brakes should be flagged and a hard copy of the visual inspection results forwarded with the monthly report.

3. Machine Disposition Record Keeping

Machine disposition record keeping should include a Daily Usage log and a Service and Maintenance log. A summary of these logs should be included in a table as part of the monthly report.

Monthly reports shall be forwarded to:

Steven J. Shaffer, Ph.D.
Research Scientist
Battelle Memorial Institute
505 King Avenue
Columbus, Ohio 43201-2693
(614) 424-4960

A sample Summary Usage Table follows:

Summary of Brake Tester Usage for the Month of May, 1996--**EXAMPLE**

Number of Days in month	31
Number of Days Scheduled for Machine Operation	23
Actual Days of Machine Operation	16
Days not operated due to manpower	8
Days not operated due to machine problems or service requirements	4
Days not operated due to weather	3
Number of trucks on which screenings were performed	320
Number of trucks that were manually checked after screening	20
Number of vehicles put out of service after confirmation of problem (Level 1 or IV Brake Inspection)	15
Number of Vehicles unable to put out-of-service due to inability to confirm problem	5
<p>Explanation of "down" days:</p> <p>Machine was down 4 days for routine maintenance and calibration</p> <p>Other comments:</p>	

Other Requirements:

1. Data Verification

To verify the data; State inspectors should consider both correlations with CVSA results (verification of screening), and machine operational characteristics. Each test should be evaluated to determine if it was conducted properly and if the machine was working properly. The vendor and/or other agency can provide assistance with data interpretation.

2. Maintenance plan (agency responsible, maintenance log).

A well defined maintenance plan should be outlined in which an individual or agency is responsible for routine maintenance as specified by the manufacturer. In addition, a local service representative shop (for any required repairs or modifications) should be identified if vendor does not have local representative.

A list of any problems that develop should be kept. The list should include the date and conditions under which the problem was encountered (to assist with troubleshooting). The vendor should be held responsible for responding to those items on the list in a timely fashion. Such a time frame, and the consequences of not meeting the time frame, should be agreed to and formalized in writing between the State and the vendor as part of the purchase contract.

3. Vendor requirements:

Training - Both on-site classroom and hands-on training is necessary. The former should include examples of brake inspections and anticipated problems and troubleshooting techniques. The latter should include truck testing in a control setting (using a "cooperative" truck), as well as field experience. At least two full days of field testing (a minimum of 12 truck inspections using the machine) are recommended.

Identification of a specific vendor employee, or "key contact", for dealing with questions or problems.

Manufacturer should provide:

- a) Operations Manual
- b) Maintenance schedule and guide
- c) Troubleshooting Guide
- d) Parts List and Relevant Drawings
- e) Guaranteed availability for unique parts

The warrantee (Length and coverage) and Service Contract (Extended warrantee, duration and cost) should be agreed upon and documented.

Future uses

As CVSA inspection criteria or FMCSR standards are developed for the enforceable use of performance-based brake testing machines, software modifications may be made to the machines to enable the States to issue citations directly from the machine output. Tie-in to some of the ITS technology for advance clearance may also be possible.

Some of the machines have the ability to be used for more detailed diagnostics of brake systems. We therefore encourage each State to coordinate with local fleets for testing of their trucks.



U.S. Department
of Transportation
**Federal Highway
Administration**

Memorandum

SP-97-002-CE

Subject: OMC Guidelines for Performance-based
Brake Testing Technologies

Date: OCT 8 1996

From: Director, Office of Motor Carrier
Safety & Technology

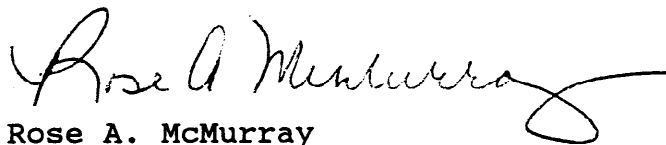
Reply to
Attn. of: HSA-30

To: Regional Directors, Office of Motor Carriers
Regions 1-10
THRU: Mr. Clinton O. Magby, II
Director, Office of Motor Carrier
Field Operations, HFO-1

During April of 1996, the Office of Motor Carriers, Office of Safety and Technology distributed eligibility requirements for two performance-based brake testing devices under MCSAP. The devices are prototype in nature, and were approved for screening and sorting purposes only.

The attached document supercedes policy memorandum SP-96-005-CE "OMC Guidelines for Performance-Based Brake Testing Devices." The revisions contained herein reflect the continuing evolution of the project, and provide more flexibility to interested States.

Please distribute the attachment to your State MCSAP agency. Should you have questions regarding the guidelines or report, please contact Bill Mahorney (202) 366-6515 or Paul Alexander (202) 366-5881.


Rose A. McMurray

Attachment

OMC GUIDELINES FOR PERFORMANCE-BASED BRAKE TESTING DEVICES

Synopsis: This document supersedes Policy Memorandum SP-96-005-CE, OMC Guidelines for Performance-Based Brake Testing Devices. Further developments in the advanced brake testing area has necessitated revisions to the aforementioned policy. As mentioned in the previous memorandum, these brake testing devices are approved for **screening and sorting purposes** only at this time. It is suggested that each interested State read the Interim Report (distributed during April 1996) to determine, which, if any, machine is most suitable for the individual needs. A final report will be published during FY 1997 that will describe additional technologies and results of further testing. The Office of Motor Carriers Safety and Technology envisions the development of performance specifications and test procedures to include other types of performance-based brake testing devices in the future.

It is important to note that these machines are prototypes, and may be modified based on the manufacturers response to our findings. As a result, we recognize that changes in design will occur. To be eligible for funding, any new or redesigned version of these two machines must be cleared through NHTSA's Vehicle Research and Test Center to ensure that the machines do not materially differ from those approved. Additionally, upgrades or enhancements to existing machines must also be cleared in the same manner.

Product Availability: Hunter B400T Flat-Plate Tester (in-ground), Nepean Mark III Roller Dynamometer (portable), Nepean Mark IV Roller Dynamometer (portable).

Funding Options: MCSAP Basic, supplemental, roll-over, or special (w/20% match) Grants.

Associated Costs: Costs of machine usage, including, but not limited to: maintenance agreements, future hardware and software upgrades, replacement/repair/maintenance of non-warrantied items, towing vehicle (must be justified, location and use factors, etc.), training (initial and ongoing), etc.

State Enforcement Plans/Grant Requests:

1. Each State must submit an enforcement plan/grant request that describes how, where and when each machine will be utilized.

Based upon OMC's experience with the project "Development, Evaluation, and Application of Performance-Based Brake Testing Devices" it is **suggested** that a State establish and commit to specific procedures in order to effectively utilize these performance-based brake testing devices. Additionally, this information could possibly assist in the acquisition of data and statistics that will enable the future development of enforceable, performance-based criteria. **Suggested** procedures could include:

2. Monthly Reporting (a sample summary usage table is attached)
 - A summary of usage and maintenance logs, including:

- The number of days used, number of days not used due to a) machine problems, b) manpower (including weekends, holidays, or other days not scheduled for use), or c) weather.
- The number of trucks tested, and the number put out of service as a result of CVSA inspection to confirm machine indicated problem, and the number of vehicles for which a machine-identified problem could not be confirmed on vehicle.
- Any vehicles that you are unable to inspect and the reason.
- Any sites (for portable units only) at which you are unable to deploy or use the machine properly, and a description.
- Any weather conditions that make operation difficult or impossible.
- Machine disposition record keeping should include a Daily Usage log and a Service and Maintenance log. A summary of these logs should be included in a table as part of the monthly report.

It is strongly recommended that a State collect and retain on floppy disc the results of all tests performed for a minimum of 1 year. If a defective brake was indicated, and the machine appeared to properly test the brake, then a full Level I or Level IV CVSA brake inspection should be performed to verify defects, and take appropriate action. Test results of "defective" brakes should be flagged and a hard copy of the visual inspection results retained.

Other Requirements:

1. Data Verification

- To verify the data, State inspectors should consider both correlations with CVSA results (verification of screening), and machine operational characteristics. Each test should be evaluated to determine if it was conducted properly and if the machine was working properly. The vendor and/or other agency can provide assistance with data interpretation.

2. Maintenance plan (agency responsible, maintenance log).

- A well defined maintenance plan should be outlined in which an individual or agency is responsible for routine maintenance as specified by the manufacturer. In addition, a local service representative shop (for any required repairs or modifications) should be identified if vendor does not have local representative.

- A list of any problems that develop should be kept. The list should include the date and conditions under which the problem was encountered (to assist with troubleshooting). The vendor should be held responsible for responding to those items on the list in a timely fashion. Such a time frame, and the consequences of not meeting the time frame, should be agreed to and formalized in writing between the State and the vendor as part of the purchase contract.

3. Vendor requirements:

- Training - Both on-site classroom and hands-on training is necessary. The former should include examples of brake inspections and anticipated problems and troubleshooting techniques. The latter should include truck testing in a controlled setting (using a "cooperative" truck). Additionally, at least two full days of field testing/training (a minimum of 12 truck inspections using the machine) are recommended.
- Identification of a specific vendor employee, or "key contact", for dealing with questions or problems.
- Manufacturer should provide:
 - a) Operations Manual
 - b) Maintenance schedule and guide
 - c) Troubleshooting Guide
 - d) Parts List and Relevant Drawings
 - e) Guaranteed availability for unique parts
- Warrantee (Length and coverage) and Service Contract (Extended warrantee, duration and cost) should be agreed upon and documented.

Future uses

As CVSA inspection criteria or FMCSR standards are developed for the enforceable use of performance-based brake testing machines, software modifications may be made to the machines to enable the States to issue citations directly from the machine output. Tie-in to some of the ITS technology for advance clearance may also be possible.

Some of the machines have the ability to be used for more detailed diagnostics of brake systems. We therefore encourage each State to coordinate with local fleets for testing of their trucks.

Summary of Brake Tester Usage for the Month of May, 1996--**EXAMPLE**

Number of Days in month	31
Number of Days Scheduled for Machine Operation	23
Actual Days of Machine Operation	16
Days not operated due to manpower	8
Days not operated due to machine problems or service requirements	4
Days not operated due to weather	3
Number of trucks on which screenings were performed	320
Number of trucks that were manually checked after screening	20
Number of vehicles put out of service after confirmation of problem (Level 1 or IV Brake Inspection)	15
Number of Vehicles unable to put out-of-service due to inability to confirm problem	5
<p>Explanation of "down" days:</p> <p>Machine was down 4 days for routine maintenance and calibration</p> <p>Other comments:</p>	



U.S. Department
of Transportation
**Federal Highway
Administration**

MAR 13 1997

400 Seventh St., S.W.
Washington, D.C. 20590

Refer to: HSA-30

Mr. Scott Giles
Vice President
Hicklin Engineering
3001 NW 104th Street
Des Moines, Iowa 50322

Dear Mr. Giles:

Please find enclosed a copy of policy memorandum SP-97-005-CE, titled "Additional Brake Testing Device Added to OMC Guidelines for Performance-based Brake Testing Technologies." The purpose of the memorandum is to inform the State Motor Carrier Safety Assistance Program (MCSAP) lead agencies that the Hicklin RBD Roller Dynamometer (portable) has met the eligibility requirements and is approved for screening and sorting and should be added to the "Product Availability" list.

We appreciate your efforts and contributions to the project and look forward to your continued support. If you should have questions relating to this letter or to the program, please feel free to give me a call at (202) 366-9579.

Sincerely yours,

Paul C. Alexander
Project Manager

Enclosure

HSA30:PAlexander:rh:6-9579:3/12/97
cc: HSA30 RF, K.Hartman, L. Minor
H:\HSA\PALEXANDER\GILES.LET



U.S. Department
of Transportation
**Federal Highway
Administration**

Memorandum

SP-97-005-CE

Subject: Additional Brake Testing Device Added to OMC Guidelines for Performance-based Brake Testing Technologies Date: MAR 11 1997

From: Director, Office of Motor Carrier Safety & Technology Reply to: HSA-30
Attn of:

To: Regional Directors, Office of Motor Carriers
Regions 1-10
THRU: Mr. Clinton O. Magby, II
Director, Office of Motor Carrier
Field Operations

This memorandum is in reference to policy memorandum SP-97-002-CE "OMC Guidelines for Performance-Based Brake Testing Devices" dated October 8, 1996. During April of 1996, the Office of Motor Carrier Safety and Technology distributed eligibility requirements for two performance-based brake testing devices under the MCSAP. The devices are prototype in nature, and were approved for screening and sorting purposes only.

Recently, the **Hicklin RBD Roller Dynamometer (portable)** has met the eligibility requirements and is now approved for screening and sorting. The other machines listed under "**Product Availability**" are; Hunter B400T Flat-Plate Tester (in-ground), Nepean Mark III Roller Dynamometer (portable), Nepean Mark IV Roller Dynamometer. This addition reflects the continuing evolution of the project, and provides a broader selection of brake testing machines to interested States.

Please distribute the attachment to your State MCSAP agency. Should you have questions regarding the guidelines or report, please contact Kate Hartman at 202-366-2742 or Paul Alexander at 202-366-5881.



Rose A. McMurray

Attachment



U.S. Department
of Transportation
**Federal Highway
Administration**

400 Seventh St., S.W.
Washington, D.C. 20590

NOV 3 1998

Refer to: HSA-20

Mr. Dick Radlinski
Radlinski and Associates
3143 Count Road 154
East Liberty, OH 43319

Dear Mr. Radlinski:

Please find enclosed a copy of policy memorandum SP-99-002-CE, titled "Revised OMC Guidelines for Performance Based Brake Testing Technologies." The purpose of this memorandum is to inform the State Motor Carrier Safety Assistance Program (MCSAP) lead agencies that the Radlinski Associates in-ground and portable roller dynamometers have met the eligibility requirements and are approved for screening and sorting and should be added to the "Product Availability" list.

We appreciate your efforts and contributions to the project and look forward to your continued support. If you should have questions relating to this letter or to the program, please feel free to give me a call at (202)366-2742.

Sincerely yours,

Kate Hartman
Transportation Specialist

Enclosure

HSA20:KHartman:x62742:11/2/98
cc: HSA20 RF, L Minor HCS-10, P Alexander OMC-IN
H:\HSA\KHARTMAN\BRAKES\RAIAPROV.WPD

SP-99-002-CE

INFORMATION: Revised OMC Guidelines for
Performance-Based Brake Testing Technologies

October 23, 1998

Director, Office of Motor Carrier
Safety & Technology

HSA-20/30

State Directors, Office of Motor Carriers

This memorandum, and the attachment supersedes State Programs Division policy memorandum SP-97-005-CE, "Additional Brake Testing Devices Added to OMC Guidelines for Performance-Based Brake Testing Devices (PBBT)."

The Office of Motor Carrier Safety and Technology is revising the guidelines for performance-based brake testing devices to add the in-ground and portable roller dynamometers offered by Radlinski and Associates, Inc. (RAI) as eligible for funding under the MCSAP. The acceptance of the RAI portable dynamometer is contingent upon:

1. Flat ramp sections being used for the purpose of leveling tandem axles; and
2. Maximum capacity of the motors activating the roller must be sufficient to enable the measurement of a maximum brake force of at least 5,500 pounds.

The previously approved PBBT's are still eligible for funding under MCSAP. These machines include: Hunter B400T Flat-Plate Tester (in-ground), Nepean Mark III Roller Dynamometer (portable), Nepean Mark IV Roller Dynamometer (portable), Hicklin RBD (portable), RAI 12200 (in-ground), and RAI 20200 (portable).

The revisions in the attached guidelines reflect the progress that has been made in developing functional specifications for performance-based brake testers, and the future issuance of a notice of proposed rulemaking concerning brake force regulations that would be enforced through the use of brake testing technologies.

Please distribute the attachment to your State MCSAP agency. Should you have questions regarding the guidelines or report, please contact Kate Hartman at 202-366-6515 or Paul Alexander at 317-226-7445.

Rose A. McMurray

Attachment

FHWA GUIDELINES FOR PERFORMANCE-BASED
BRAKE TESTING TECHNOLOGIES

PURPOSE

This document provides guidelines for purchase and use of certain performance-based brake testing devices under the MCSAP. **These brake testing devices are approved for screening and sorting purposes only at this time.**

BACKGROUND

In 1993, the FHWA initiated a research program to evaluate various performance-based brake testing technologies for use on commercial motor vehicles. The purpose of the program was to determine, through field-test data collection, if performance-based brake inspection technologies could improve or assist with the throughput and accuracy of the current inspection techniques which involve visual examination of components, measurement of push-rod travel on air-braked vehicles, and listening for air leaks. Following the completion of the first task of the program, in which various performance-based technologies were analyzed, several of the systems were selected for evaluation in a roadside field-test inspection program.

During the field tests, inspections were performed using both visual and performance-based methods to compare their ability to detect vehicle brake defects. In particular, a Commercial Vehicle Safety Alliance Level 4 inspection (consisting of the brake and tire portion of a Level 1 inspection) was conducted in addition to a performance-based brake test. The dual inspections were performed by State officials in each of eight States that volunteered to participate in the field test program.

The data collected from these dual inspections were tabulated and correlations were sought between (1) violations of the Federal Motor Carrier Safety Regulations (FMCSRs) and the North American Uniform Vehicle Out-of-Service Criteria used by officials in the United States, Canada, and Mexico, and (2) various pass/fail criteria used by manufacturers of performance-based technology. In addition to the performance-based brake "failure" information, data relating to the operational characteristics of each prototype machine were also collected and evaluated. These data included setup and tear down times, vehicle inspection times, maintenance requirements, user friendliness, calibration procedures and results, operator skill-level requirements and information to generate a cost-benefit analysis. A key source of data was the interviews with State inspectors.

The preliminary findings from the first phase of the prototype brake testing program are documented in an interim report, "Evaluation of Performance-Based Brake Testing Technologies," December 1995, FHWA-MC-96-004. The interim report presents findings based upon approximately one year of data from roller dynamometers used in Colorado and Ohio, and a flat plate tester in Minnesota.

Subsequent to the publication of the interim report, West Virginia participated in the field test evaluation of a roller dynamometer. Wisconsin is collecting data on a flat-plate tester, and Maryland and Nevada are collecting data on breakaway torque testers. Connecticut participated in the testing of a roller dynamometer for several months but elected to discontinue its involvement in the research program. The final report has been submitted to the FHWA by the researchers and will be published by the FHWA in early 1999.

The agency has also published a TechBrief, "Development, Evaluation, and Application of Performance-Based Brake Testing Technologies." It is suggested that each interested State read the TechBrief for an overview of the research program, and final report to learn more about the pros and cons of each machine to determine whether their respective programs could be enhanced through the use of performance-based brake testers.

DEVELOPMENT OF FUNCTIONAL SPECIFICATIONS

The Office of Motor Carriers Safety and Technology envisions the development of performance specifications and test procedures to include other types of performance-based brake testing devices in the future. On June 5, 1998, the FHWA published a notice requesting public comments on the development of performance specifications (63 FR 30678). The final specifications will be published in early 1999.

DEVELOPMENT OF ENFORCEABLE REGULATIONS

On October 2, 1998, the FHWA held a public meeting to discuss the development of commercial motor vehicle brake force regulations that could be enforced by Federal and State officials using performance-based brake testing technologies. Currently, vehicles that fail a brake performance test must be inspected to determine the reason for the poor test results. Motor carriers cannot be cited for brake-related violations of the FMCSRs solely on the basis of the results from a performance-based brake tester because the current regulations do not make reference to the specific aspects of brake performance that are evaluated by the brake testers. Therefore citations are based upon the specific defects or deficiencies found during the in-depth inspection.

The FHWA is considering the development of pass/fail criteria for braking force that could be enforced by Federal and State officials using performance-based brake testing technologies. As inspection criteria or regulations are developed through the rulemaking process, the use of the performance-based brake testing machines could be expanded to include enforcement of the new Federal brake performance standards. The new standards would be an alternative to the stopping distances from 32.2 kilometers per hour (20 miles per hour) currently specified in 49 CFR 393.52 but rarely enforced by Federal and State officials because of difficulties in performing such tests at roadside. If brake force standards are developed through the rulemaking process, Federal, State, and local government inspectors would be able to issue citations based upon the output from the brake testers. The FHWA expects to publish a notice of proposed rulemaking early in 1999.

MCSAP FUNDING ELIGIBILITY

The Office of Motor Carrier Safety and Technology has issued three memoranda advising agency staff that specific performance-based brake testing machines are eligible for funding under the MCSAP. The memoranda indicated that the devices are prototypes, and are approved for screening and sorting purposes only. This means that States may request funding to purchase one of the approved brake testers for use in screening or sorting vehicles at inspection sites. The final version of the functional specifications would be used by the States as guidelines to determine whether the purchase of a specific brake tester would be an eligible expense in the future.

It is important to note that most of the machines currently in use are prototypes, and may be modified based on the manufacturers response to our findings. As a result, we recognize that changes in design will occur. To be eligible for funding, any new or redesigned version of these machines must be approved by the Office of Motor Carrier Safety and Technology to ensure that the machines do not materially differ from those approved. Additionally, upgrades or enhancements to existing machines must also be cleared in the same manner.

PRODUCTS APPROVED FOR MCSAP FUNDING

- Hunter B400T Flat-Plate Tester (in-ground)
- Nepean Mark III Roller Dynamometer (portable)
- Nepean Mark IV Roller Dynamometer (portable)
- Hicklin RBD (portable)
- RAI 12200 (in-ground)
- RAI 20200 (portable).

FUNDING OPTIONS

MCSAP Basic or Roll Over.

ASSOCIATED COSTS

Costs of machine usage, including, but not limited to: maintenance agreements, future hardware and software upgrades, replacement/repair/maintenance of non-warrantied items, towing vehicle (must be justified, location and use factors, etc.), or training (initial and ongoing).

REQUIREMENTS FOR COMMERCIAL VEHICLE SAFETY PLAN (CVSP)

A State must include in its CVSP how, where and when each machine will be utilized. A State should establish and commit to specific procedures in order to effectively utilize these performance-based brake testing devices. The procedures should include:

1. Maintaining a Monthly Report - Monthly reports should include a tabular summary of usage and maintenance logs, including:

- The number of days used, number of days not used due to a) machine problems, b) manpower (including weekends, holidays, or other days not scheduled for use), or c) weather.
- The number of trucks tested, and the number put out of service as a result of CVSA inspection to confirm machine indicated problem, and the number of vehicles for which a machine-identified problem could not be confirmed on vehicle.
- Any vehicles that you are unable to inspect and the reason.

2. Machine Disposition Record Keeping

- Machine disposition record keeping should include a Daily Usage Log and a Service and Maintenance Log. A summary of these logs should be included in a table as part of the monthly report.

EXAMPLE: Summary of Brake Tester Usage

Number of Days in month	31
Number of Days Scheduled for Machine Operation	23
Actual Days of Machine Operation	16
Days not operated due to manpower	8
Days not operated due to machine problems or service requirements	4
Days not operated due to weather	3
Number of trucks on which screenings were performed	320
Number of trucks that were manually checked after screening	20
Number of vehicles put out of service after confirmation of problem (Level 1 or IV Brake Inspection)	15
Number of Vehicles unable to put out-of-service due to inability to confirm problem	5
Explanation of "down" days: Machine was down 4 days for routine maintenance and calibration Other comments :	

FHWA RECOMMENDATIONS TO STATES:

1. Data verification:

- To verify the data, State inspectors should consider both correlations with CVSA results (verification of screening), and machine operational characteristics. Each test should be evaluated to determine if it was conducted properly and if the machine was working properly. The vendor and/or other agency can provide assistance with data interpretation.

2. Maintenance plan (agency responsible, maintenance log):

- A well defined maintenance plan should be outlined in which an individual or agency is responsible for routine maintenance as specified by the manufacturer. In addition, a local service representative shop (for any required repairs or modifications) should be identified if vendor does not have local representative.
- A list of any problems that develop should be kept. The list should include the date and conditions under which the problem was encountered (to assist with troubleshooting). The vendor should be held responsible for responding to those items on the list in a timely fashion.

3. Vendor requirements:

- Training: Both on-site classroom and hands-on training is necessary. The former should include examples of brake inspections and anticipated problems and troubleshooting techniques. The latter should include truck testing in a control setting (using a "cooperative" truck), as well as field experience. At least two full days of field testing (a minimum of 12 truck inspections using the machine) are recommended.
- Identification of a specific vendor employee, or "key contact", for dealing with questions or problems.
- Manufacturer should provide:
 - a) Operations Manual
 - b) Maintenance schedule and guide
 - c) Troubleshooting Guide
 - d) Parts List and Relevant Drawings
 - e) Guaranteed availability for unique parts
- Warrantee (Length and coverage) and Service Contract (Extended warrantee, duration and cost) should be agreed upon and documented.